

## CLAIMS

1 1. A large bandwidth add-drop filter for a planar waveguide device comprising:  
2 at least one coupler receiving an input signal and providing an output signal; and  
3 at least two grating waveguides having a photonic band-gap covering at least 4 optical  
4 channels.

1 2. An add-drop filter as claimed in claim 1, wherein the photonic band-gap covers at  
2 least 8 optical channels.

3 3. An add-drop filter as claimed in claim 1, wherein the grating waveguides have a  
superstructure grating strength profile.

4 4. An add-drop filter as claimed in claim 1, wherein the grating waveguides have a  
sampled grating strength profile.

5 5. An add-drop filter as claimed in claim 1, wherein at least one coupler comprises a  
directional coupler.

6 6. An add-drop filter as claimed in claim 1, wherein at least one coupler comprises  
multi-mode interference waveguides.

7 7. An add-drop filter as claimed in claim 1, wherein at least one coupler comprises  
diffracting slab waveguides.

1           8. An add-drop filter as claimed in claim 1, wherein at least one coupler comprises  
2     diffracting slab waveguides. An add-drop filter as claimed in claim 1, wherein one or more  
3     grating arms comprises delay-line waveguides.

1           9. An add-drop filter as claimed in claim 1, further comprising two couplers, in which  
2     a first coupler provides an input port and a drop port and a second coupler provides an add  
3     port and a transmission port.

1           10. An add-drop filter as claimed in claim 1, wherein the grating waveguides have  
2     superstructure grating strength profiles providing spectrally periodic transmission bands  
3     aligned with optical channels.

1           11. An add-drop filter as claimed in claim 9, wherein the superstructure has one or  
2     multiple superperiods.

1           12. An add-drop filter as claimed in claim 1, wherein the grating waveguides have  
2     sampled grating strength profiles providing a window transmission function, covering a band  
3     of optical channels.

1           13. An add-drop filter as claimed in claim 1, wherein the grating waveguides have  
2     sampled grating strength profiles providing two or more window functions, each covering  
3     bands of optical channels.

1           14. An add-drop filter as claimed in claim 1 further comprising a grating tuner for  
2     changing a group velocity of one or more of the grating waveguides.

1 15. An add-drop filter as claimed in claim 13, wherein the grating tuner heats at least  
2 one of the grating waveguides.

1 ~~16.~~ A filter for a planar waveguide device comprising:

2 at least one coupler receiving an input signal and providing an output signal; and

3 at least two grating waveguides having a grating strength of higher than about

4  $\kappa = 0.006 \mu m^{-1}$ .

1 ~~17.~~ A filter for a planar waveguide device comprising:

2 at least one coupler receiving an input signal and providing an output signal; and

3 at least two grating waveguides having a grating strength of higher than about

4  $\kappa = 0.013 \mu m^{-1}$ .

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